a flight of gulls, a stork leaving its nest, and a flying vulture, are particularly good.

The author separates birds into four groups, according to the characteristics of their flight, as follows:—(1) Wings always flapping; (2) flapping alternating with downward gliding; (3) Flapping and gliding with maintained level; (4) gliding and soaring only.

This classification can hardly be considered satisfactory. It is suggested that a bird can fly without any expenditure of work provided that there is even a slightly variable wind, and the article concludes with the hope that the day is not far distant when (by proper automatic devices to take advantage of wind variation) flying machines will be able to do without engines.

In reality no bird or flying machine can maintain its level or rise in still air or in a uniform horizontal wind without the expenditure of power, and although it is true that power may be gained from the air by a proper utilisation of the differences of the horizontal velocity in the different regions traversed, these differences would have to be large even for the sustenance of long-winged birds, and there is no direct evidence that this kind of flight is habitual with them.

It is not improbable, however, that with their long experience birds have found out its possibility, and the skimming of some birds near the surface of the waves, where the variations of velocity are great, may be a case in point, but there can be little doubt that when flying at a considerable height birds depend for their support on an upward component in the velocity of the wind.

A. MALLOCK.

A group of Gulls in flight, showing various positions of the wings of birds.

SCIENCE AND LITERATURE.

AN eloquent address on language and literature was delivered on January 27 by Lord Morley of Blackburn, as president of the English Association. Parts of the address dealt with the relation between science and letters, with particular reference to the use of scientific knowledge in poetry, and the antithesis between documentary fact and artistic style. Science aims at concise and truthful expression; and while Lord Morley testified to the value of its influence upon literature, he doubted whether scientific ideas had inspired even Tennyson to the best verse, whether the desire for fact scientifically recorded is not a misfortune in the treatment of modern history, and whether concentration upon scientific truth has not a deadening effect upon emotional conceptions and pleasures.

Lord Morley's tribute to some scientific masters of clear and simple exposition resigns us to his subsequent conclusions. Keats could not forgive optics for robbing the rainbow of its wonder and mystery, and Lord Morley seems to suggest that the literary art which deals with scientific studies and results is not of the highest. But poetry is imagery, and new images of Nature are made possible by every discovery of the attributes and meaning of the things around us. The poetry which neglects advances of natural knowledge becomes conventional in form and substance, concerning itself only with the wonders of childhood because it does not understand the higher and grander mysteries which science has failed to penetrate. His-

tory is concerned with the accumulation and consideration of facts with the view of arriving at correct conclusions from them; and in this respect it must be studied by the methods of science, though the human factor makes the problems more difficult than when material things only are involved. There is, however, no intrinsic reason why Gibbon's majesty of historic conceptions, and the symmetric grandeur of his design, should not be combined with such great learning as was displayed by Lord Acton. Accurate knowledge must surely not be considered as antithetic to perfection of style.

The instance of Darwin's loss of interest in poetry and music proves little. A wide search through the biographies of distinguished men of science will only reveal two or three cases in which devotion to studies of Nature has resulted in the atrophy of æsthetic faculties. Close concentration upon any particular subject often leads to indifference to the aims and work of others; but this is as true of art, or poetry, or music, as it is of science. There is less reason for believing that the man of science has usually no taste for literature, music, or other forms of refined and imaginative expression, than there is for concluding that artists, musicians, and poets have no interest in the attentive study of natural objects and phenomena. If science and documentary evidence are responsible for an age of prose, it is because the poets have been spinning cobwebs from their brains when they ought to have been learning something of the spirit and achievements of science. These are they who, having never entered upon scientific pursuits, are, to use Herbert Spencer's words, "blind to most of the poetry by which they are surrounded."

Subjoined are some extracts from Lord Morley's address—

Let me offer a few words on the effects of the relations of letters and science. We may obviously date a new time from 1859 when Darwin's "Origin of Species" appeared, and along with two or three other imposing works of that date launched into common currency a new vocabulary. We now apply in every sphere, high and low, trivial or momentous, talk about evolution, natural selection, environment, heredity, survival of the fittest, and all the rest. The most resolute and trenchant of Darwinians has warned us that new truths begin as rank heresies and end as superstitions; and if he were alive to see to-day all the effects of his victory on daily speech, perhaps he would not withdraw his words. That great controversy has died down, or at least takes new shape, leaving, after all is said, one of the master contributions to knowledge of nature and its laws and to man's view of life and the working of his destinies.

Scientific interest has now shifted into new areas of discovery, invention, and speculation. Still the spirit of the time remains the spirit of science, and fact and ordered knowledge. What has been the effect of knowledge upon form, on language, on literary art? It adds boundless gifts to human conveniences. Does it make an inspiring public for the master of either prose or verse? Darwin himself made no pretentions in authorship. He once said to Sir Charles Lyell that a naturalist's life would be a happy one if he had only to observe and never to write. Yet he is a writer of excellent form for simple and direct description, patient accumulation of persuasive arguments, and a noble and transparent candour in stating what makes against him, which, if not what is called style, is better for the reader than the finest style can be. One eminent literary critic of my acquaintance finds his little volume on earthworms a most fascinating book even as literature. Then, although the controversial exigencies of his day affected him with a relish for laying too lustily about him with his powerful flail, I know no more lucid, effective, and manful English than you will find in Huxley. What more delightful book of travel than the "Himalaya Journals" of the great naturalist Hooker, who carried on his botanical explorations some sixty years ago, and happily is still among us?

Buffon, as man of science, is now, I assume, little more than a shadow of a name, and probably even the most highly educated of us know little more about him than his famous pregnant saying that the style is the man—a saying, by the way, which really meant no more than that, while nature gave the material for narrative, it is man who gives the style. Yet the French to this day count him among the greatest of their writers for order, unity, precision, method, clearness in scientific exposition of animated nature, along with majestic gifts of natural eloquence. Then comes the greatest of all. Whatever the decision may be as to the value of Goethe's scientific contribution, this, at least, is certain, that his is the most wondrous, the unique case of a man who united high original scientific power of mind with transcendent gifts in flight, force, and beauty of poetic imagination.

As for science and the poets, only the other day an attractive little book published by Sir Norman Lockyer shows how Tennyson, the composer of verse unsurpassed for exquisite music in our English tongue, yet followed with unflagging interest the problems of evolution and all that hangs upon them. Whether astronomy or geology—terrible muses, as he well might call them—inspired the better elements of his beautiful work, we may doubt. An English critic has had the courage to say that there is an insoluble element of prose in Dante, and Tennyson has hardly shown that the scientific ideas of an age are soluble in musical words. Browning, his companion poet, nearly universal in his range, was too essentially dramatic, too independent of the scientific influences of his day, too careless of expression, to be a case much in point. Tennyson said of him, he had power of intellect enough for all of them, "but he has not the glory of words." Whether he had or not, science was not responsible.

I should like to name in passing the English poet who, in Lowell's words, has written less and pleased more than any other. Gray was an incessant and a serious student in learned tongues; and his annotations on the "Systems of Nature," by Linnæus, his contemporary, bear witness to his industry and minute observation as naturalist.

In prose fiction was one writer of commanding mind, saturated with the spirit of science. Who does not feel how George Eliot's creative and literary art was impaired, and at last worse than impaired, by her daily associations with science? Or would it be truer to say—I often thought it would—that the decline was due to her own ever-deepening sense of the pain of the world and the tragedy of sentient being?

Let us look at the invasion of another province by the spirit of the time. The eager curiosity of all these years about the facts of biology, chemistry, physics, and their laws has inevitably quickened the spread both of the same curiosity and the same respect, quickened by German example, for ascertained facts into the province of history. Is the pure scientific impulse—to tell the exact truth with all the necessary reservations—easy to combine with regard for artistic pleasure?

The English writer of our own immediate time, with the fullest knowledge and deepest understanding of the fact and spirit of history, would, I think, be pronounced by most critics with a right to judge to be the late Lord Acton. Acton's was a leading case where knowledge and profundity was not matched by form. His page is overloaded, he is often over-subtle, he has the fault—or shall I call it the literary crime?—of allusiveness and indirect reference—he is apt to put to his reader a riddle or a poser, and then to leave him in the lurch. Here is Acton's own account of the historian's direct debt to the methods of science:—"If men of science owe anything to us," he says, "we may learn much from them that is essential. For they can show how to test proof, how to secure fulness and soundness in induction, how to restrain and employ with safety hypothesis and analogy. It is they who hold the secret of the mysterious property of the mind by which error ministers to truth, and truth irrecoverably prevails."

Where the themes and issues are those of scientific truth, that prose should be unemotional is natural. Every-

body knows Darwin's own account, how, as the laborious years passed, he so lost his taste for poetry that he could not endure to read a word of it; Shakespeare became so dull it nauseated him, and music set him thinking too energetically on what he had been working at, instead of giving him pleasure. If all this loss was the price of years of fruitful concentration in the master, who can wonder if the scientific and documentary age is an age of prose?

NOTES.

We are delighted to learn that the sum of 25,000*l.* required for the purchase of the site for new chemical laboratories at University College, London, has now been obtained, thanks to a generous gift of 4500*l.* from Mr. Ralph C. Forster, The Grange, Sutton, Surrey. He is a member of the firm of Messrs. Bessler, Waechter, and Co., merchants, of Salisbury House, E.C. He was Sheriff for the county of Surrey in 1906. The total sum required for the purchase of the site and the erection of the laboratories was 70,000*l.* It is estimated that a sum of between 45,000*l.* and 50,000*l.* is still required for the erection of the buildings. It is hoped that this object will commend itself to the generosity of some public-spirited citizen, who will come forward with what is required to complete the scheme.

The Chemical Society of France has recently elected the following foreign honorary members:—A. v. Baeyer, Munich; Emil Fischer, Berlin; P. Guye, Geneva; L. Henry, Louvain, Belgium; C. Istrati, Bucharest; A. Lieben, Vienna; Louguinine, St. Petersburg; Raphael Meldola, London; Paternò, Rome; Sir Wm. Ramsay, London; and Ira Remsen, Baltimore. The late Prof. S. Cannizaro had also been nominated by the council, but his death prevented his nomination being confirmed by the general meeting of the society.

An international committee of representative men of science of distinguished eminence has been formed to raise the funds necessary to celebrate appropriately the jubilee of Prof. Gaston Darboux's connection with French university education, the distinguished work he has done for mathematics, and his services as permanent secretary of the Paris Academy of Sciences. Donations may be sent to Prof. Guichard, the general secretary of the international committee, at the Sorbonne, Paris. It is proposed to present Prof. Darboux with a medal, reproducing his portrait, together with an address signed by the subscribers. Subscriptions of 25 francs will give the right to a medal in bronze, and of 50 francs to a medal in silver, which will be reduced reproductions of that to be offered to Prof. Darboux.

The death is announced, in his seventy-first year, of M. E. A. Léveillé, formerly president of the French Entomological Society.

The president of the Bureau des longitudes in Paris for the present year is M. G. Bigourdan. M. B. Baillaud is the vice-president, and M. H. Andoyer the secretary.

On Wednesday next, February 8, a portrait of Prof. W. Boyd Dawkins, F.R.S., will be publicly presented to the University of Manchester by the subscribers. The presentation will take place in the Whitworth Hall of the University at 4 p.m.

At a meeting of the research department of the Royal Geographical Society on Thursday, February 16, Prof. Edgeworth David, C.M.G., F.R.S., who was geologist on Sir Ernest Shackleton's Antarctic expedition, will submit his views on certain important Antarctic problems, namely, climate, physical structure, tectonic relations with the Andes, &c.

Four lectures on plague will be delivered on February 14, 15, 16, and 17 by Dr. F. M. Sandwith, Gresham professor of physic, at the City of London School, Victoria Embankment, E.C. The lectures are free to the public, and will begin each evening at six o'clock.

At a recent general meeting of the Liverpool Astronomical Society it was resolved to raise a special fund for the purpose of a memorial to the late Mr. R. C. Johnson, whose long connection with the society, in which he filled the positions of secretary and president, and his services in the interests of astronomical science, suggest that some permanent recognition of his work should be made.

A memorial in marble to the late Sir John Evans, K.C.B., has been placed by his friends in the parish church of Abbot's Langley, Herts—a parish in which Sir John resided for sixty years of his life. The inscription on the tablet records not only the eminence of Sir John Evans in science, but likewise the high administrative and judicial positions he held in the county.

During the last fifty years Profs. Luiji Palmieri, M. S. di Rossi and others, have, with tromometers, microphones, and various other contrivances, endeavoured to record the internal murmurings and thunderings of Vesuvius, Etna, and other volcanoes. One of the last professors of vulcanology at the Royal University of Naples was H. J. Johnston-Lavis, whose work has been chiefly directed to the mineralogy and petrology of volcanoes. Now it is rumoured that Italy is to have a Vulcanological Institute, for the establishment of which the chief governments will be invited to contribute 60,000*l.* Mr. Immanuel Friedlaender, who resides in Naples and has recently published a work on the volcanoes of Japan, has promised, it is said, 4000*l.* towards this fund.

The centenary of the foundation of the publishing firm of B. G. Teubner, of Leipzig, will be commemorated on Friday, March 3. A large number of representatives of science and education have been invited to take part, and hotel accommodation is being arranged on behalf of those who have accepted the invitations.

An oversea flight of about a hundred miles was made by Mr. McCurdy on January 30 with an aeroplane of the Curtis type, weighing 750 lb. and possessing a 60-horse-power motor. Mr. McCurdy attempted to fly from Key West, Florida, to Havana, a distance of about 110 miles across the Florida Straits. When about ten miles from his destination he had to descend on account of the lubricating oil having been exhausted. The aëroplane was equipped with pontoons, which enabled the descent upon the sea to be made without injury to it or the airman.

The British South Africa Company, Reuter's Agency states, has decided upon the despatch of a special commission to investigate sleeping sickness in Rhodesia. The commission will consist of Dr. Aylmer May, principal medical officer of northern Rhodesia; Dr. A. Kinghorn, of the Liverpool School of Tropical Medicine; Dr. Leach, of the Northern Rhodesian Medical Service; Mr. O. Silverlock, entomologist; and Mr. Jollyman, bacteriologist. As explained in Nature of December 1 (p. 147), it is believed that in north-eastern Rhodesia and Nyasaland sleeping sickness is not transmitted by *Glossina palpalis*, but is probably carried by *G. morsitans*, a species which, unlike *G. palpalis*, is not confined to well-defined and